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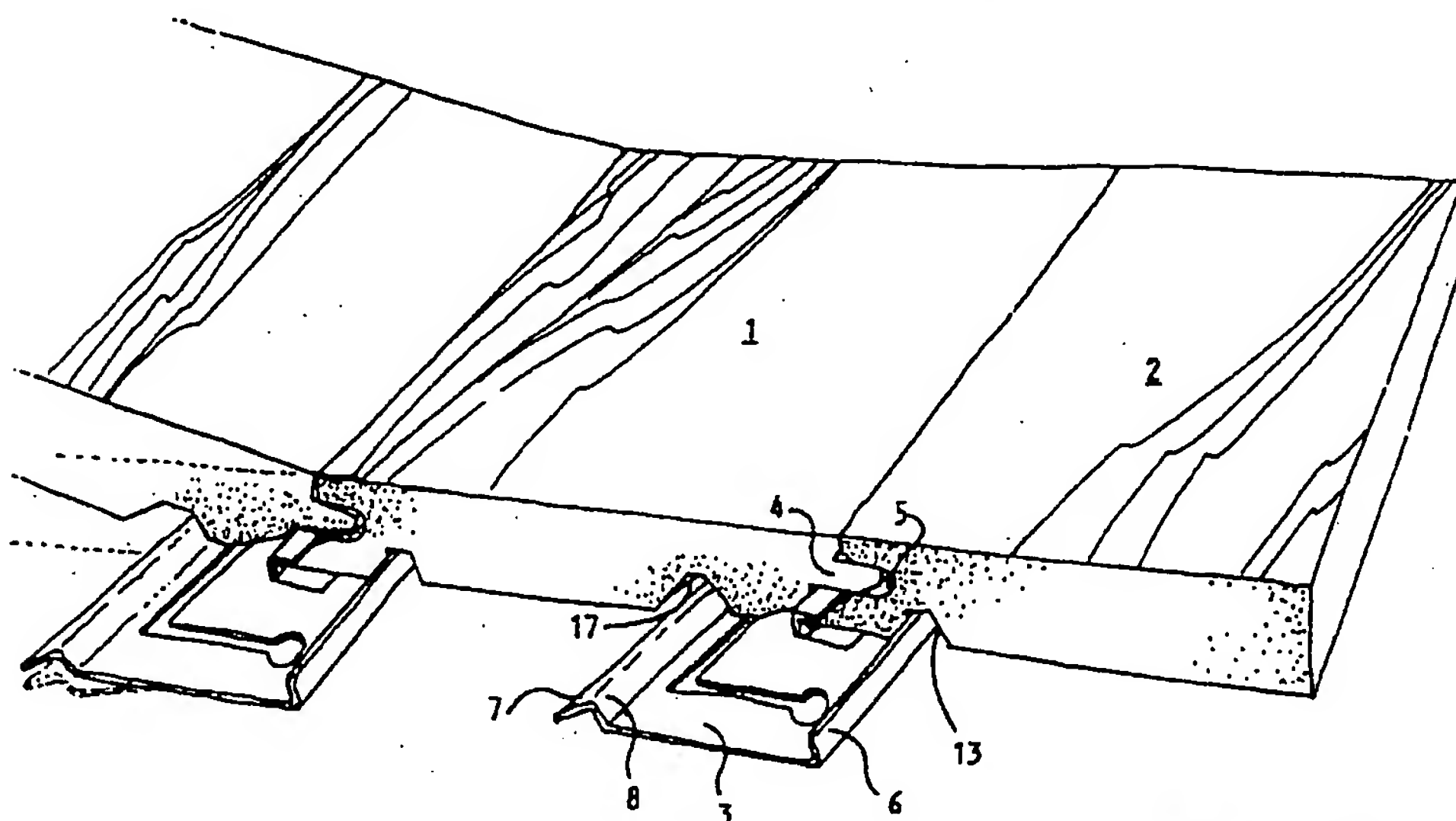
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(54) **A combined set comprising a locking member and at least two building panels**

(57) A combined set comprising at least one locking member and at least a first and second building panel, said locking member being provided for interconnecting said first and second building panel, each of said building panels having a first groove provided for receiving a first lip of said locking member and a second groove provided for receiving a second lip of said locking member,

each building panel being provided with a continuous rebated groove penetrating into a first edge and with a protrusion extending lengthwise along a second edge opposite to said first edge, in such a manner that said protrusion of one of the building panels fits into the rebated groove of the other building panel, said locking member being provided to be removably clamped into said first and second groove.



**Fig. 1b**

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## Description

[0001] The present invention relates to a combined set, comprising at least one locking member and at least a first and second building panel, in particular a floor panel, said locking member being provided for interconnecting said first and second building panel, each of said building panels having a first groove provided for receiving a first lip of said locking member and a second groove provided for receiving a second lip of said locking member.

[0002] Such a combined set is known from EP-S-0698162. In the known combined set, the locking member is rigidly connected by means of its first and a further lip to a bottom part of the building panel. The first and further lip form a dove tail that is rigidly clamped to the bottom of the building panel. Each building panel comprises at one lateral side an upper recess and at the opposite lateral side a lower recess, in such a manner, that upon assembling two building panels, the lower recess of one building panel is shifted under the upper one of another building panel. Both building panels are locked together by clicking the second lip of the locking member into the second groove after shifting the recesses with respect to each other.

[0003] A drawback of the known combined set is that the locking member is the sole member that effectively contributes to the connection of both building panels with each other. The upper and lower recess do not effectively contribute to the connection of both building panels. The application of the locking member to the bottom of the building panels is a cumbersome and therefor expensive operation as the first and second lip need to be bent according to a dove tail pattern in order to obtain a reliable locking of two panels to each other.

[0004] It is an object of the invention to realise a combined set comprising at least one locking member and at least a first and second building panel having a less cumbersome locking member.

[0005] A combined set according to the present invention is therefor characterised in that each building panel is provided with a continuous rebated groove, penetrating into a first edge and with a protrusion extending lengthwise along a second edge, opposite to said first edge, in such a manner, that said protrusion of one of the building panels fits into the rebated groove of the other building panel, said locking member being provided to be removably clamped into said first and second groove. The continuous rebated groove in combination with the protrusion, enables to shift the latter into the rebated groove and to obtain in such a manner a connection of two building panels to each other since the protrusion fits into the rebated groove. The fact that the rebated groove penetrates into the first lateral edge, enables the protrusion to penetrate into the rebated groove and to obtain a clamping of the protrusion into the rebated groove. Since the protrusion and the rebated groove contribute to the locking of two building panels

with each other, the locking member is no longer the only one enabling the connection. Therefor the locking member is now removably clamped to the first and second grooves which enables an easier manufacturing as there is no need to clamp the locking member on the bottom of the building panel.

[0006] A first preferred embodiment of a combined set according to the present invention is characterised in that at least one front side of the rebated groove is bevelled. The bevelled front side simplifies the introduction of the protrusion into the rebated groove.

[0007] A second preferred embodiment of a combined set according to the present invention is characterised in that said second groove and a backside of said protrusion are separated by a barrier made within the material of the building panel. The barrier facilitates the mounting of two building panels into each other and forms an upstanding wall of the second groove.

[0008] Preferably, a front side of said barrier and said second lip are bevelled. This facilitates the shifting operation of the protrusion into the rebated groove as well as the introduction of the second lip into the second groove.

[0009] Preferably, the second lip forms an angle  $\alpha$  with a bottom plane of said locking member and wherein  $90^\circ \leq \alpha \leq 120^\circ$ . This facilitates on the one hand the bending of the locking member upon mounting two building panels into each other, and on the other hand leads to a suitable clamping.

[0010] A third preferred embodiment of a combined set according to the present invention is characterised in that a recess is applied in said second lateral edge, starting from said protrusion and extending towards an upper face of said building panel. A dust collector is formed in such a manner which enables the evacuation of dust or other small particles which would stick to the lateral edge and could perturb a tight fitting of two adjacent building panels.

[0011] A fourth preferred embodiment of a combined set according to the present invention is characterised in that said locking member comprises a hook and said rebated groove comprises a further recess applied in a base thereof for receiving said hook. A reliable clamping of the locking member to the building panel is obtained in such a manner.

[0012] A fifth preferred embodiment of a combined set according to the present invention is characterised in that said second lip is resiliently applied on said locking member. The assembling of two building panels is simplified in such a manner.

[0013] The invention will now be described in more details with reference to the annexed drawings showing a preferred embodiment of a combined set according to the invention. In the drawings :

fig. 1 a) shows an overall view of two building panels fitted together;

fig. 1 b) shows an overall view of two building panels

already fitted together and a third one being added to them;

fig. 2 shows the locking member attached to one of the building panels;

fig. 3 shows a detailed view of a locking member;

fig. 4 illustrates how a first building panel is engaged into a second one;

fig. 5 and 6 show each time the different steps of connecting two building panels to each other.

[0014] In the drawings, a same reference sign has been assigned to a same or analogous element.

[0015] The combined set, such as illustrated in figure 1, comprises at least one locking member 3 and at least a first 1 and a second 2 building panel. The building panels are in particular formed by floor panels. Although the present invention is not limited to floor panels and can also be used as wall or ceiling panels. The panels are for example made of wood, High Density or Low Density Board or synthetic material.

[0016] The first panel 1, is attached to the second panel 2 by means of a protrusion 4 extending lengthwise along a second lateral edge of panel 2. The protrusion 4 fits into a continuous rebated groove 5 penetrating into a first lateral edge of the first building panel 2. The locking member 3 is removably clamped to both building panels. To this purpose the locking member comprises a first lip 6, which upon mounting, is inserted into a first groove 13 situated at a bottom side of the building panel. A second lip 7, 8 of the locking member is inserted into a second groove 17 also situated at a bottom side of the building panel.

[0017] As illustrated in more details in the figures 2 and 3, the locking member 3, preferably made of stainless steel or plastic, comprises a hook 9 which makes a substantially right angle with a bottom plane of the locking member. The hook 9 is preferably situated in a central part of the locking member and preferably made by cutout and bending a part of the material of the bottom plane.

[0018] A cutout 11, preferably U-shaped, is further applied in the bottom plane of the locking member in order to make the second lip 7, 8 resilient. The cutout preferably ends in two circular perforations 21 and 22. A further perforation 10 is applied in the bottom plane and provided to receive a nail, screw or the like (22) see figures 5 and 6, in order to fix the locking member to the surface on which the building panel will be applied. The further perforation 10 is preferably applied in front of the hook 9 in order to not disturb the resilient properties of the locking member.

[0019] The first lip 6, preferably extends perpendicular with respect to the bottom plane of the locking member. Although other alternatives such as for example L-shaped are also possible. The second lip, which is situated at the opposite side of the one where the first lip is situated, comprises a first inclined rising border 8 followed by a second inclined descending border 7. The

angle  $\alpha$  of the rising border, extending between the bottom plane and the first border, is situated between 90 and 120°. The angle  $\beta$  of the descending border, extending between the first and second border, is approximately 45°. The first and second border can either extend over the whole length of the locking member, as illustrated, or only over a part thereof and be formed by two separate parts. The cutouts 11, the angles  $\alpha$  and  $\beta$  and the material of which the locking member is made, determine the resilient properties thereof. The transition between first and second border of the second lip is preferably rounded, in order to avoid sharp angles which could injure.

[0020] Upon mounting the locking member to a building panel, the hook 9 is first engaged into the rebated groove 5 (see also figures 5 and 6 a), in order to be removably fixed to the panel. To this purpose, the rebated groove comprises a recess 24 applied in a base of the groove 5, in order to not obstruct the insertion of the protrusion 4 and to form a support for the latter when the hook is applied thereon. Once the hook is applied to the recess 24, the hook is pivoted (see figures 5 and 6 a) counterclockwise, in order to engage the first lip 6 into the first groove 13. Since the first lip is perpendicular with respect to the bottom plane of the locking member, the first groove preferably also has a perpendicular wall with respect to the bottom of the building panel. In such a manner, the first lip 6 mates correctly with the first groove, leading to a reliable connection. That the opposite wall of the first groove is inclined, is merely due to the milling operation performed to apply the first groove.

[0021] As can be seen in figures 5 and 6, the rebated groove 5 extends continuously over the whole length of a first lateral edge of the building panel. The rebated groove 5 penetrates over a depth of for example 5 to 8 mm into the material of the building panel and is situated substantially in the middle of the first edge. The thickness of the rebated groove 5 corresponds with the one of the protrusion 4, in order to mate with each other.

[0022] The front side of the rebated groove, situated opposite to the one where the recess 24 is situated, is bevelled, and so is a front edge, preferably the one situated on the upper side of the protrusion 4. The bevelled front side and the bevelled edge facilitate the initial engagement of the protrusion into the rebated groove. The bevelled front side of the rebated groove, together with a recess 25 applied on a second lateral edge of the building panel, form a cavity 20 when first and second panel are connected to each other. The recess 25 starts from the end of the protrusion into the material of the building panel and extends towards an upper face of the building panel. The cavity 20 acts as a dust collector for dust or other particles that would remain on the lateral edges of the building panels. When mounting the building panels, those dust particles can fall into the cavity 20 and will thus not obstruct a close fitting of the first and second building panel.

[0023] A barrier 19 applied on the bottom side of the

building panel and extending preferably over the whole length of the building panel, separates the second groove 17 from the backside of the protrusion. The barrier is obtained by a milling operation on the material of which the building panel is made. By milling material away, in order to form the second groove 17 and the protrusion 4, the barrier 19 is obtained. The barrier has a bevelled front side 16 that mates with the inclination of the second border 7 and an inclined back side 18 that mates with the inclination of the first border 8 of the second lip. The front side 16 of the barrier is offset with respect to the front side of the second edge situated above the protrusion 4, in order to create sufficient space to house the hook 9 when the two building panels are mounted.

[0024] In order to insert the protrusion 4 of a first building panel 1 into the rebated groove 5 of a second building panel, once the locking element is applied, the bevelled front edge of the protrusion, situated at an upper side thereof, is brought into contact with the bevelled upper front side of the rebated groove. The first building panel can be inserted either by rotation as shown in figure 5, or horizontally as shown in figure 6.

[0025] Upon initial engagement of the protrusion into the rebated groove, the front side 16 of barrier 19 slides over the inclined second border 7 (figures 5 and 6 b). Since the latter mates, the insertion can be easily realised. Upon further engagement, the protrusion slides into the rebated groove and the second lip slides along barrier 19 in such a manner that the second border reaches the second groove 17 (figure 5 and 6 c). The resilient properties of the locking member 3 enable the bending away of the second lip, due to the pressure applied by the first building panel during mounting. Finally, the first border 8 of the second lip will reach the second groove 17. The resilient properties of the locking member will now cause the second lip to return to its rest position, locking in such a manner the second lip into the second groove by applying a pressure against the back side 18 of the barrier 19. This pressure will cause both building panels to closely fit together.

[0026] As no glue, neither a permanent mounting of the locking member to the building panels is applied, the panels can be easily dismounted by pulling away one of the building panels. The resilient properties of the locking member will cause the second lip to bend away so that the barrier 19 can slide over the first border 8, realising in such a manner the protrusion 4 from the rebated groove.

[0027] In the drawings only the rebated groove and protrusion on lateral edges are shown. The transversal edge can however also be provided with a respective rebated groove and protrusion, in such a manner that at diagonally opposed corners of a same panel, the rebated groove of a lateral edge joins the one of the transversal edge and the protrusion of the transversal edge joins the one of the lateral edge.

[0028] Instead of using the locking member, it is also

possible to glue both building panels to each other or to use nails or screws, which are applied into the surface onto which the building panels are applied. When using glue, the latter is applied into the rebated groove and eventually on the surface. The use of the locking member offers however the advantage that the building panels are removably mounted, which is not the case when they are glued together.

#### Claims

1. A combined set comprising at least one locking member and at least a first and second building panel, in particular a floor panel, said locking member being provided for interconnecting said first and second building panel, each of said building panels having a first groove provided for receiving a first lip of said locking member and a second groove provided for receiving a second lip of said locking member, characterised in that each building panel is provided with a continuous rebated groove penetrating into a first edge and with a protrusion extending lengthwise along a second edge opposite to said first edge, in such a manner that said protrusion of one of the building panels fits into the rebated groove of the other building panel, said locking member being provided to be removably clamped into said first and second groove.
2. A combined set as claimed in claim 1, characterised in that the rebated groove is situated substantially in the middle of the first edge and extends over a whole length of the building panel.
3. A combined set as claimed in claim 1 or 2, characterised in that at least one front side of the rebated groove is bevelled.
4. A combined set as claimed in claim 3, characterised in that a front edge of said protrusion is bevelled.
5. A combined set as claimed in any one of the claims 1 to 4, characterised in that said second groove and a backside of said protrusion are separated by a barrier made within the material of the building panel.
6. A combined set as claimed in claim 5, characterised in that a front side of said barrier and said second lip are bevelled.
7. A combined set as claimed in claim 5 or 6, characterised in that the second lip forms an angle  $\alpha$  with a bottom plane of said locking member and wherein  $90^\circ \leq \alpha \leq 120^\circ$ .
8. A combined set as claimed in any one of the claims



1 to 7, characterised in that a recess is applied in said second lateral edge starting from said protrusion and extending towards an upper face of said building panel.

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9. A combined set as claimed in any one of the claims 1 to 8, characterised in that said locking member comprises a hook and said rebated groove comprises a further recess applied in a base thereof for receiving said hook.

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10. A combined set as claimed in any one of the claims 1 to 9, characterised in that said second lip is resiliently applied on said locking member.

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11. A building panel as part of a combined set as claimed in any one of the claims 1 to 10.

12. A locking member as part of a combined set as claimed in any one of the claims 1 to 10.

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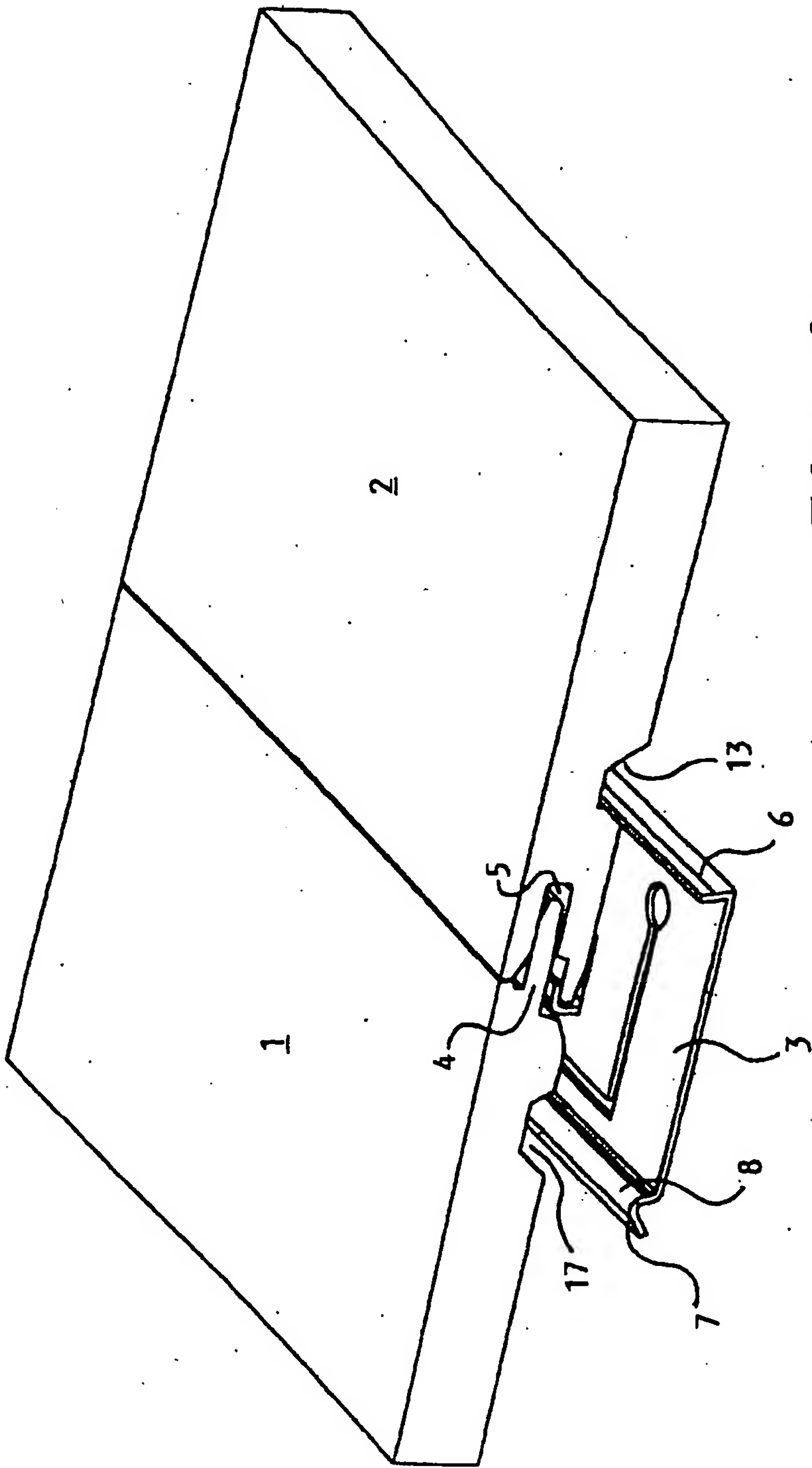
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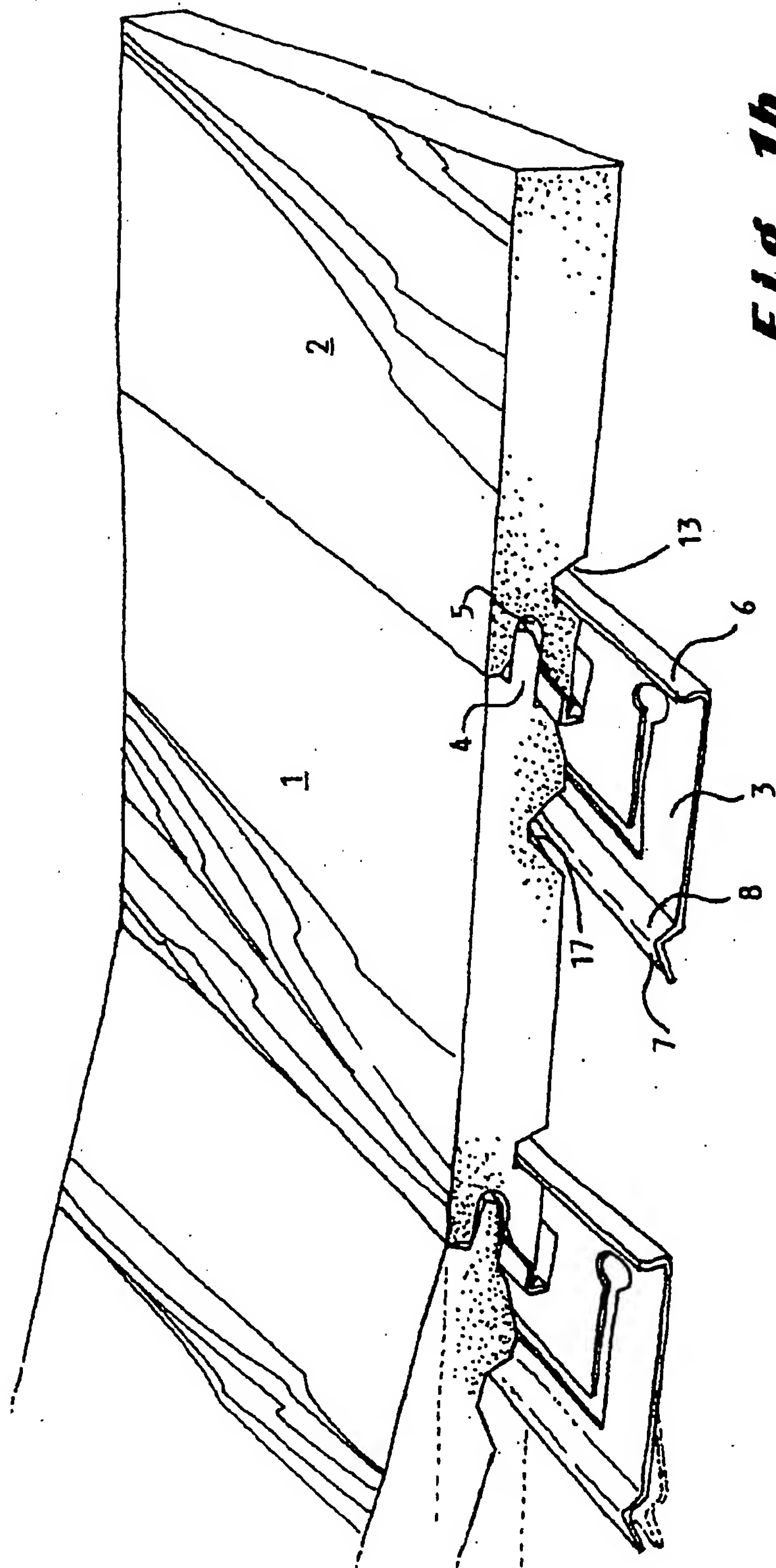
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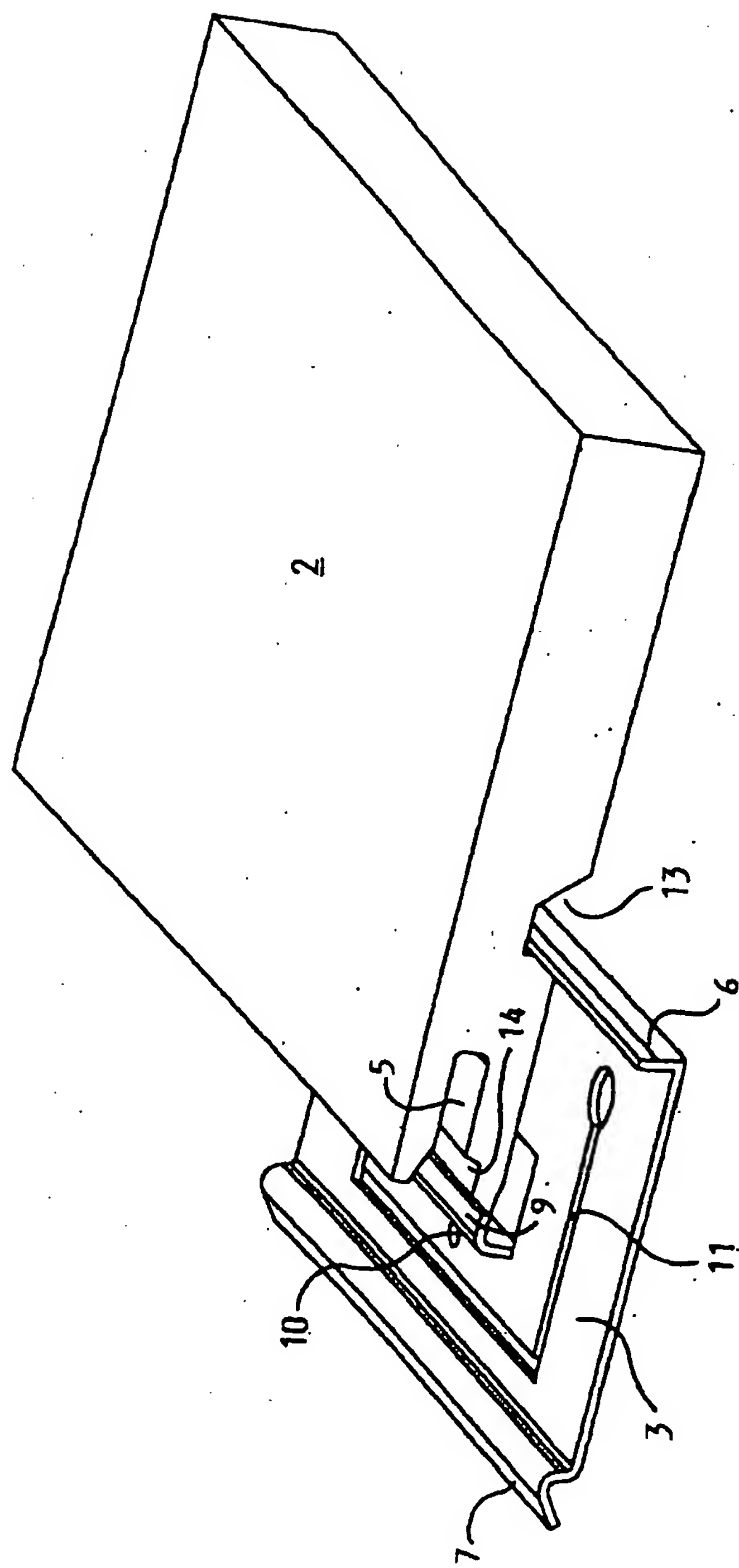
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**Fig. 1a**

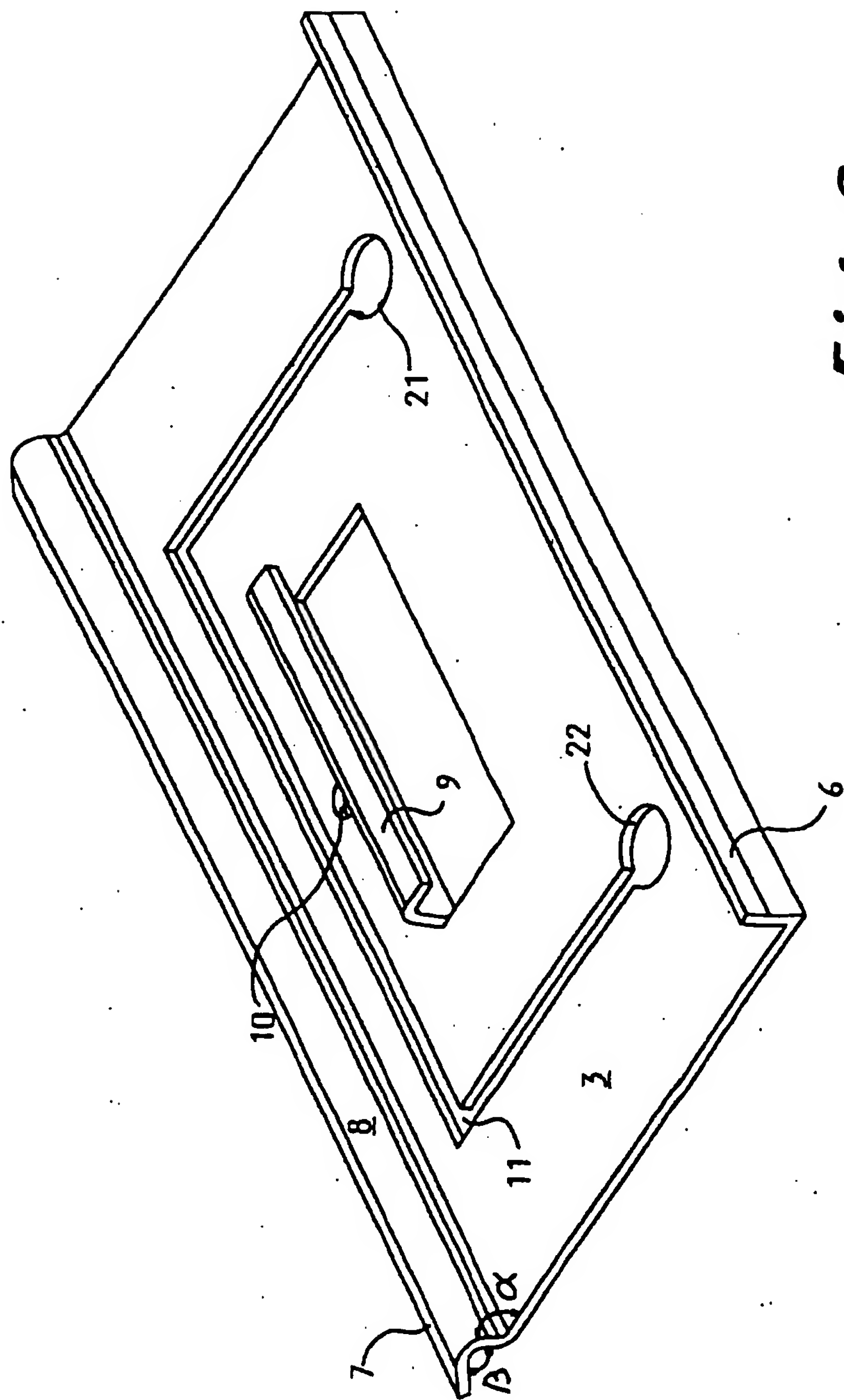


**Fig. 1b**

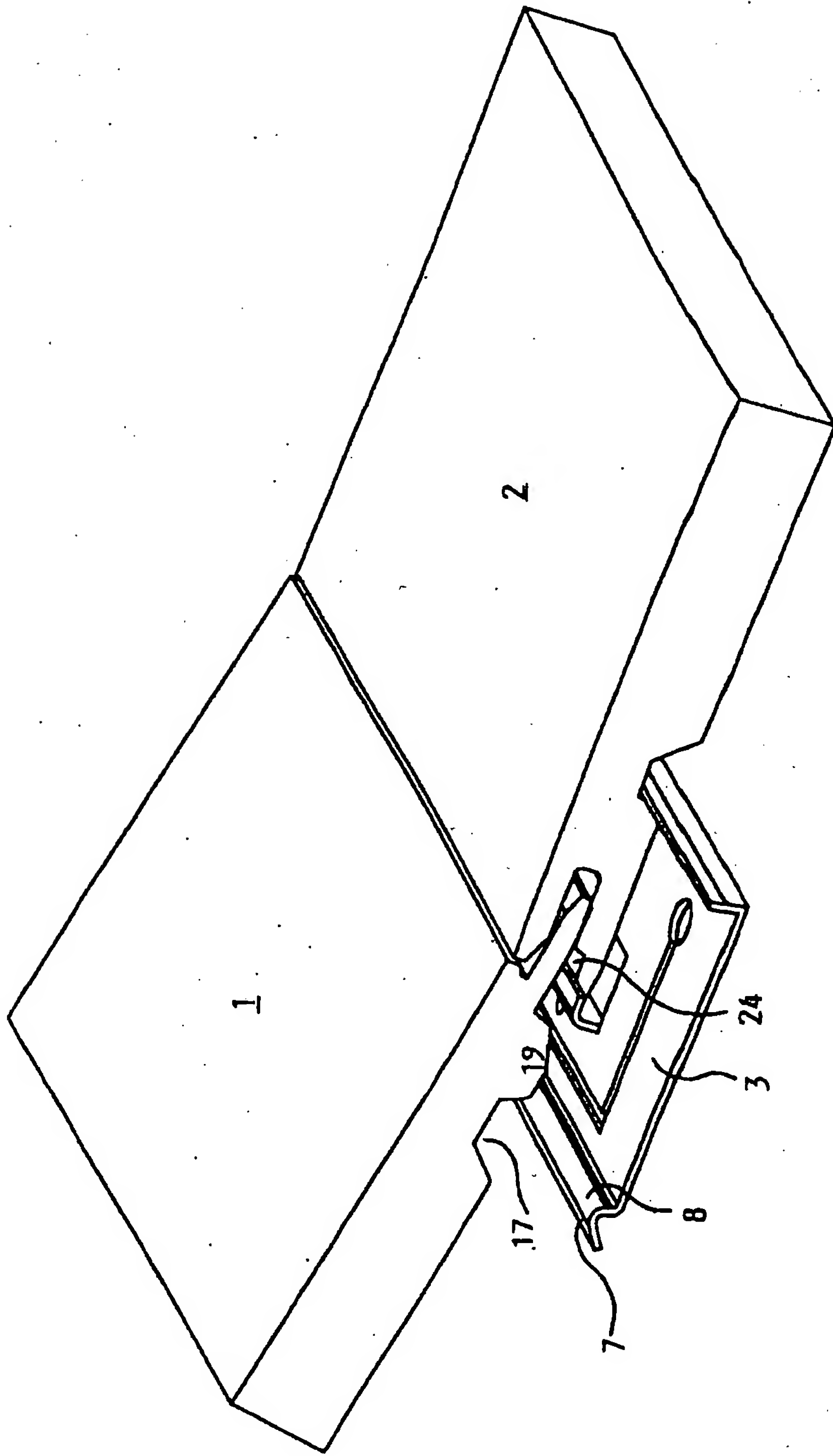


**Fig. 2**

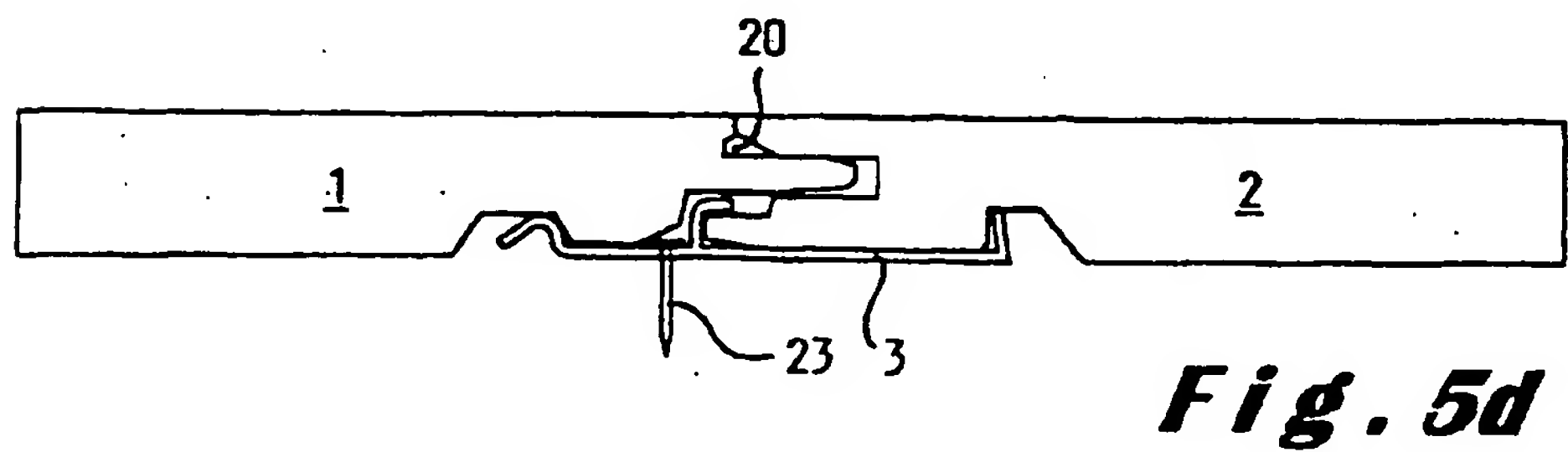
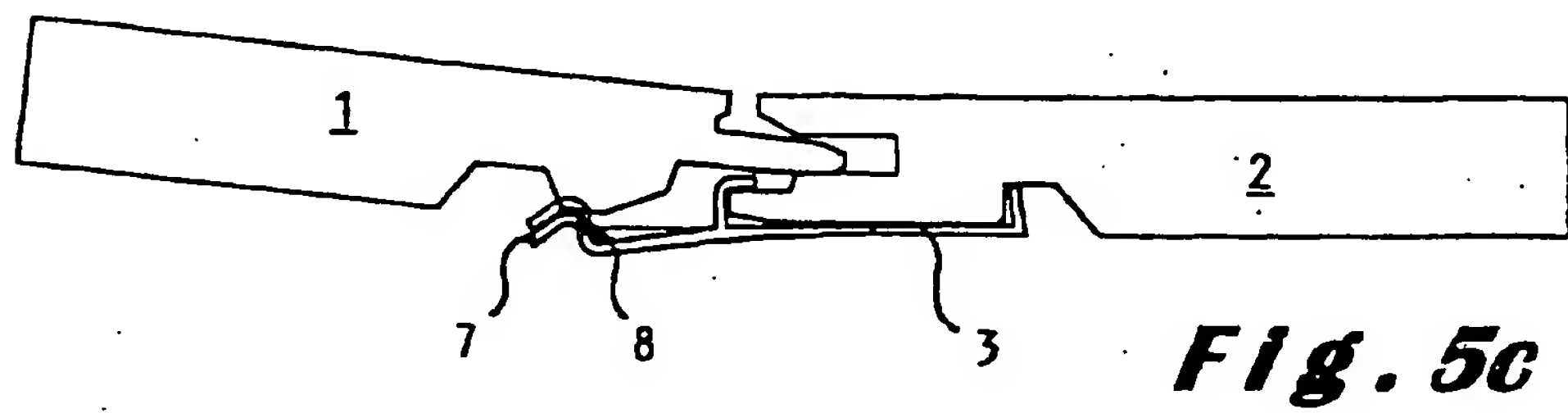
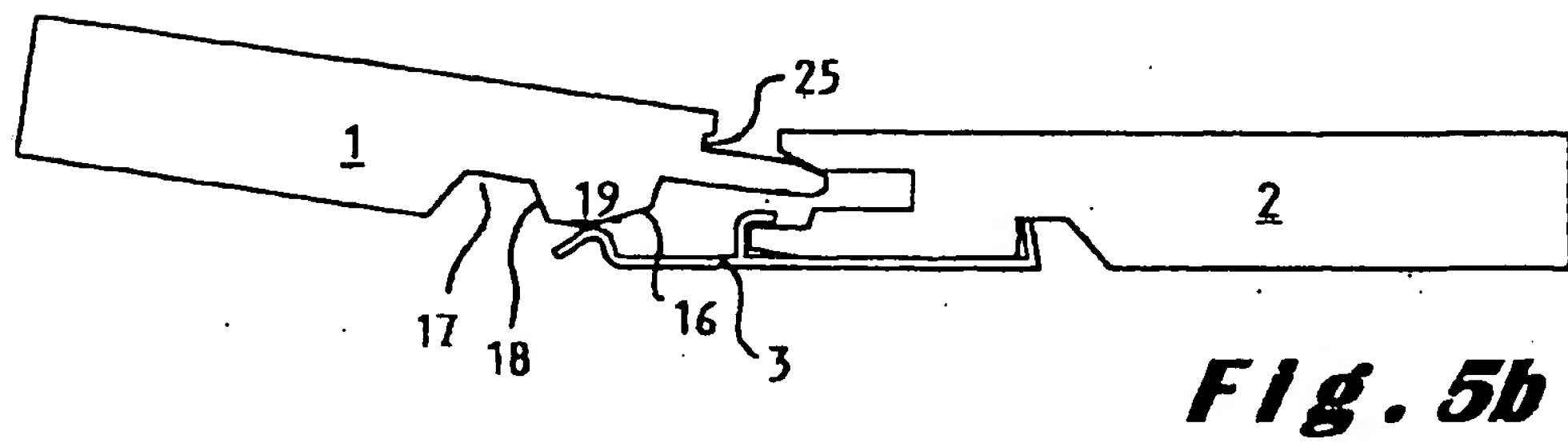
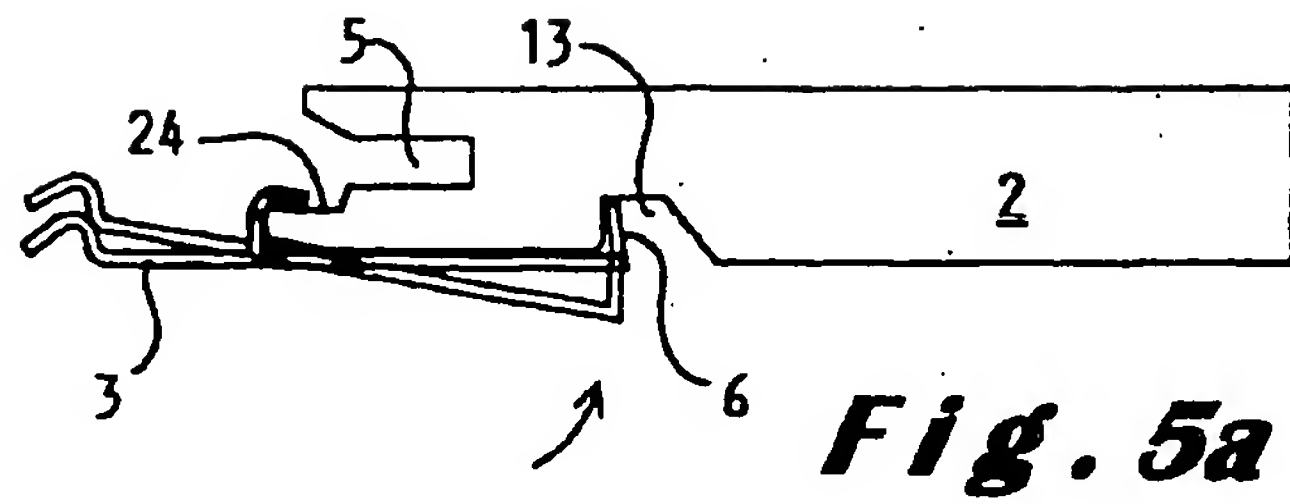


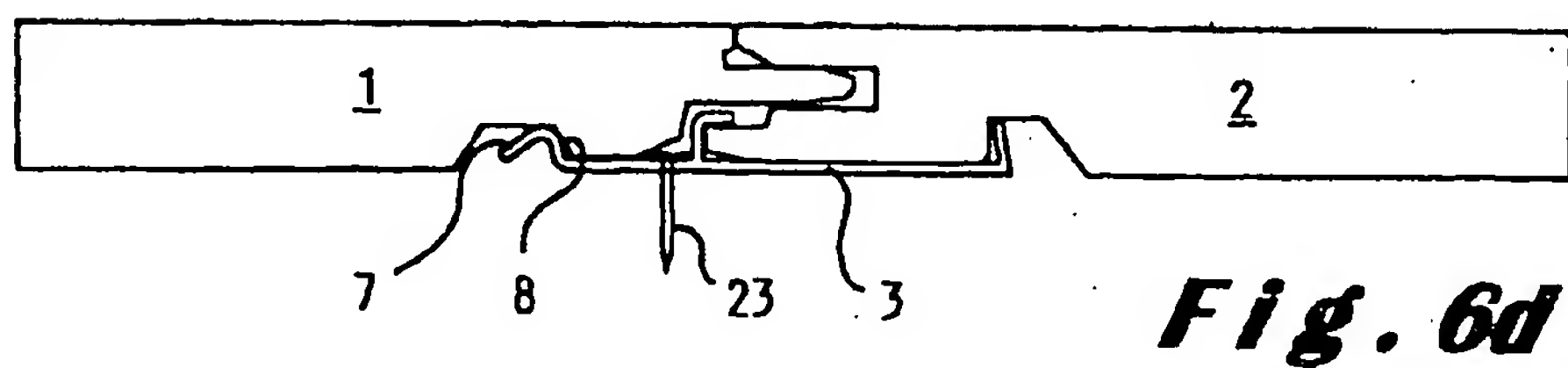
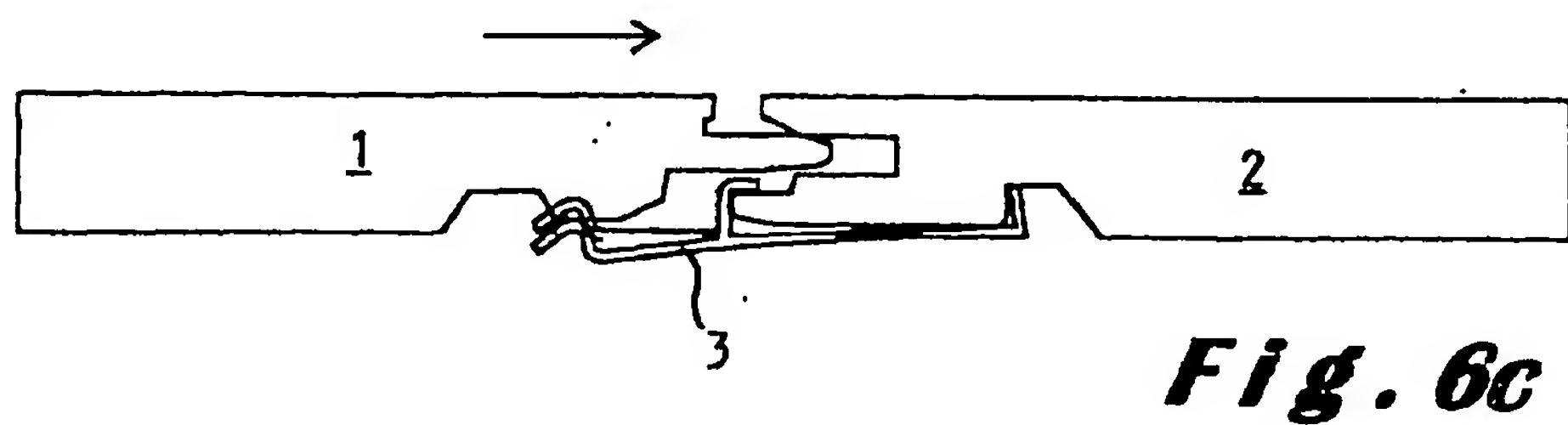
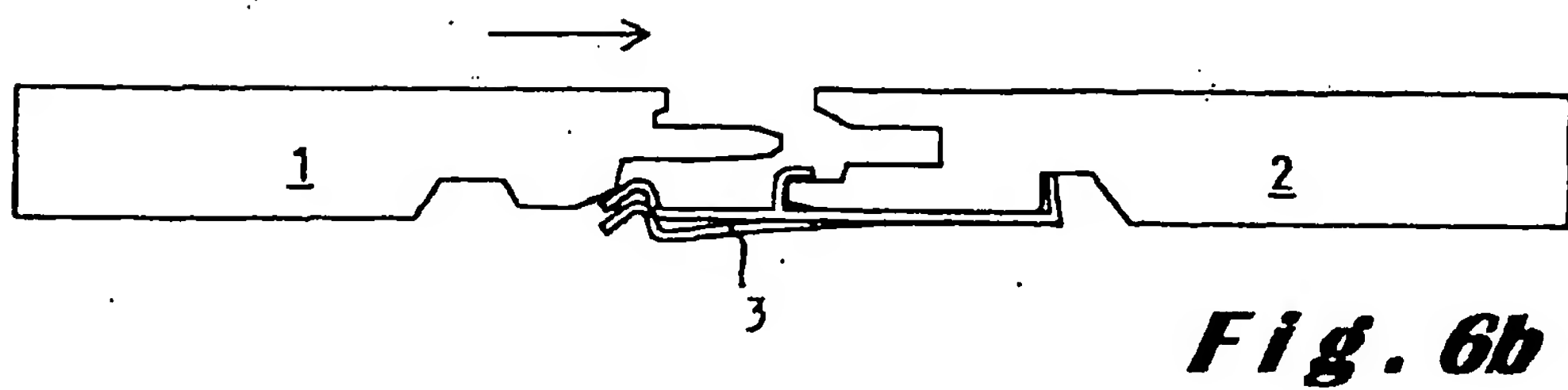
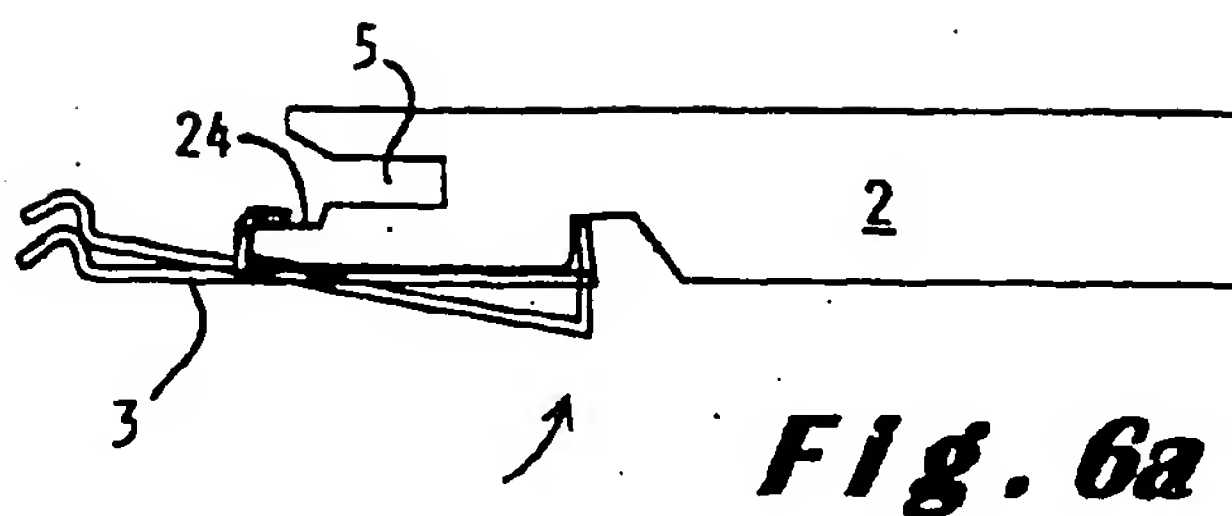


**Fig. 3**



**Fig. 4**





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## EUROPEAN SEARCH REPORT

Application Number  
EP 00 20 1235

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	WO 99 66151 A (PERVAN DARKO ;VALINGE ALUMINIUM AB (SE)) 23 December 1999 (1999-12-23) * page 17, line 20 - page 22, line 36; figures 1-8C *	1-8, 10-12	E04F15/04
A	—	9	
X	PATENT ABSTRACTS OF JAPAN vol. 1995, no. 11, 26 December 1995 (1995-12-26) & JP 07 229276 A (DANTANI PLYWOOD CO LTD), 29 August 1995 (1995-08-29) * abstract *	1,2,5,7, 10-12	
P,X	EP 0 976 889 A (KRONOSPAN AG) 2 February 2000 (2000-02-02) * column 3, line 32 - column 4, line 53; figures 1-4 *	1-3,5,7, 8,10-12	TECHNICAL FIELDS SEARCHED (Int.Cl.7)  E04F
The present search report has been drawn up for all claims			
Place of search <b>THE HAGUE</b>		Date of completion of the search <b>16 November 2000</b>	Examiner <b>Ayter, J</b>
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT  
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16-11-2000

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